

REMARKS

I. Status Summary

Claims 1-8, and 11 are pending in the instant application. Claims 1-8, and 11 presently stand rejected. Claim 7 has been amended by the present Amendment. Therefore, upon entry of Amendment A, Claims 1-8, and 11 will remain pending in the subject application.

II. Objections to the Drawings

The drawings filed on March 6, 2002 have been objected to by the Examiner under 37 C.F.R. § 1.83(a). The Examiner asserts that the drawings must show every feature of the subject matter specified in the claims. More particularly, the Examiner asserts that (1) the coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin; (2) cross-linked density range; and (3) nominal diameter must be shown or the features must be cancelled from Claims 1-8, and 11. Applicants respectfully disagree.

Applicants submit that the embodiments of the currently disclosed subject matter characterized by "the coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin" and the "cross-linked density range" are inherent physical properties of the filler and the tube and the cross-linked polyolefin, respectively, and, as such, cannot be depicted in a drawing. Further, as will become apparent in view of the Remarks provided hereinbelow, Applicants respectfully submit that the features of the subject matter which possesses the inherent physical properties of a "coefficient of thermal expansion" and "cross-linked density range," i.e., the filler and tube and the cross-linked polyolefin, are indeed deemed to be depicted in the drawings in view of their disclosure in the specification.

Accordingly, Applicants note that, for example, air blown fiber tube **10** is shown in Figure 2. Applicants further note that air blown fiber (ABF) tube **10** as depicted in Figure 2 is formed of a cross-linked polyolefin incorporating an inorganic filler as described on page 6, lines 14-22, of the application as filed. Thus, Applicants respectfully submit that the claim elements of a tube, a filler, and a cross-linked

polyolefin, as recited in Claim 1, are deemed to be depicted in the drawings in view of their disclosure in the specification.

Applicants further note that the coefficient of thermal expansion of, for example, the air blown fiber tube (ABF) 10 as shown in Figure 2 is defined, in some embodiments, as having a value of less than 150 $\mu\text{m}/\text{m}^\circ\text{C}$. See page 12, lines 5-6, of the application as filed. Additionally, Applicants note that data illustrating the reduction of low temperature shrinkage of a tube described by the present application, i.e., a tube comprising a cross-linked high density polyethylene and chopped glass fill, as compared to a mono-wall tube formed of cross-linked high density polyethylene, e.g., a polyolefin, are provided in Table 1. See page 10, lines 5-20 of the application as filed and Table 1. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would recognize that the tube and the filler depicted in, for example, Figure 1, would have, as recited in Claim 1, a coefficient of thermal expansion lower than that of the cross-linked polyolefin itself.

Thus, Applicants respectfully submit that the drawings when viewed in combination with the specification show the feature of the coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin as recited in Claim 1.

Similarly, Applicants respectfully submit that the "cross-linked density range" of the cross-linked polyolefin as recited in Claim 5, which is dependent from Claim 4 and ultimately dependent from Claim 1, is an inherent physical property of the polyolefin material itself and, as such, cannot be depicted in a drawing. Further, Applicants respectfully submit that the cross-linked polyolefin material as recited in Claim 1 and Claim 4 is deemed to be shown in the drawings. For example, Figure 2 shows air blown fiber (ABF) tube 10, which is defined on page 6, lines 14-15, of the application as filed as comprising a cross-linked polyolefin, preferably a high density cross-linked polyethylene. The density range of the high density cross-linked polyolefin is further defined on page 6, line 22, through page 7, line 1, as being between 40.0%-90% and most suitably between 65.0%-89.0% as measured by ASTM Standard D2765-95.

Accordingly, Applicants respectfully submit that the drawings when viewed in combination with the specification show the feature of the "cross-linked density range" as recited in Claim 5.

With regard to the term "nominal diameter," Applicants have deleted the phrase "a nominal diameter of 14 μm and" from Claim 7 by the present Amendment. Accordingly, Applicants respectfully submit that because the term "nominal diameter" is not recited in Claim 7 as amended, the feature of the "nominal diameter" does not need to be shown in the drawings.

In sum, Applicants respectfully submit that, in view of the above Amendments and Remarks, the drawings would be deemed to show all of the features recited in Claims 1-8, and 11 and therefore comply with 37 C.F.R. § 1.83(a). Thus, Applicants respectfully request that the objection to the drawings under 37 C.F.R. § 1.83(a) be withdrawn and that the drawings be accepted at this time.

III. Objections to the Specification

The specification has been objected to by the Examiner under 37 C.F.R. § 1.75(d). The Examiner asserts that (1) the coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin; (2) cross-linked density range; and (3) nominal diameter have not been described. Applicants respectfully disagree.

Preliminarily, Applicants note that under 37 C.F.R. § 1.75(d), the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. Applicants respectfully submit that the terms and phrases "coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin" and "cross-linked density range" have indeed been clearly in the description.

Initially, Applicants note that in some embodiments, as provided on page 12, lines 5-6, of the application as filed, the coefficient of thermal expansion of the tube described by the present application, i.e., a tube comprising a cross-linked high density

polyethylene and chopped glass fill, has a value of less than 150 $\mu\text{m}/\text{m}^\circ\text{C}$. Further, Applicants note that data illustrating the reduction of low temperature shrinkage of a tube described by the present application, i.e., a tube comprising a cross-linked high density polyethylene and chopped glass fill, as compared to a mono-wall tube formed of cross-linked high density polyethylene, e.g., a polyolefin, are provided in Table 1. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would recognize that the tube and the filler as described by the present application would have a coefficient of thermal expansion lower than that of the cross-linked polyolefin itself.

Therefore, Applicants respectfully submit that the feature of the “coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin” as recited in Claim 1 has clear support in the description and that the meaning of the phrase is ascertainable by reference to the description.

Further, Applicants note that an embodiment of the “cross-linked density range” is provided on page 6, line 23, through page 7, line 1, of the application as filed. More particularly, the description provides that, in some embodiments, the cross-linked density ranges between 40.0%-90.0% (page 6, line 24) and between 65.0%-89% (page 7, line 1) as measured by ASTM Standard D2765-95. These same ranges also are provided on page 9, lines 5-6, of the application as filed.

Therefore, Applicants respectfully submit that the feature of the “cross-linked density range” as recited in Claim 5 has clear support in the description and that the meaning of the phrase “cross-linked density range” is ascertainable by reference to the description.

With regard to the term “nominal diameter,” Applicants have deleted the phrase “a nominal diameter of 14 μm and” from Claim 7. Accordingly, Applicants respectfully submit that because the term “nominal diameter” is not recited in Claim 7 as amended, the element “nominal diameter” does not need to be described in the specification.

In sum, Applicants respectfully submit that, in view of the above Amendments and Remarks, clear support is provided for the subject matter recited in Claims 1-8, and 11 in the specification. Therefore, Applicants respectfully submit that the specification complies with 37 C.F.R. § 1.75(d). Accordingly, Applicants respectfully request that the

objection to the specification under 37 C.F.R. § 1.75(d) be withdrawn and the specification be accepted at this time.

IV. Claim Rejections – 35 U.S.C. § 112, first paragraph

Claims 1-8, and 11 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement under the assertion that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed subject matter.

More particularly, the Examiner asserts that (1) the coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin; (2) cross-linked density range; and (3) nominal diameter have been neither described in the specification nor shown in the drawings. Applicants respectfully disagree.

Applicants initially note that as a matter of Patent Office practice, the burden rests upon the Examiner to establish a prima facie case of a failure to comply with 35 U.S.C. § 112, first paragraph, with respect to the subject matter described and claimed in applicants' patent application. See Guidelines for the Examination of Patent Applications Under the 35 U.S.C. 112, ¶ 1, "Written Description" Requirement (hereinafter "The Guidelines"), 66 Fed. Reg. 1105. This burden includes "the initial burden, after a thorough reading and evaluation of the content of the application, of presenting evidence or reasons why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims." Id.

Additionally, The Guidelines state that there is a "strong presumption that an adequate written description of the claimed invention is present in the specification as filed." Id. (citing In re Wertheim, 541 F.2d 257, 262 (CCPA 1976)). Furthermore, the Examiner must establish "by a preponderance of the evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined in the claims." Id. at 1107 (citing In re Wertheim, 541 F.2d at 263).

The Examiner contends that the specification of the present application does not show that Applicants were in possession of the claimed invention. Applicants

respectfully submit, however, that 35 U.S.C. § 112, first paragraph, requires no more than a disclosure sufficient to convey to one of ordinary skill in the art that applicants were in possession of the invention commensurate with the scope of the claims. See The Guidelines at 1105 (citing Wang Labs. v. Toshiba Corp., 993 F.2d 858, 865 (Fed. Cir. 1993)). Applicants submit that this requirement has clearly been met. Accordingly, Applicants respectfully submit that a prima facie case under 35 U.S.C. § 112, first paragraph, has not been made out.

Even assuming arguendo that the Examiner has made out a prima facie case under 35 U.S.C. § 112, first paragraph, Applicants respectfully submit that the specification is in fact sufficient to convey to one of ordinary skill in the art that Applicants were in possession of the invention commensurate with the scope of the claims.

Initially, as presented hereinabove, Applicants note that in some embodiments, as provided on page 12, lines 5-6, of the application as filed, the coefficient of thermal expansion of the tube described by the present application, i.e., a tube comprising a cross-linked high density polyethylene and chopped glass fill, has a value of less than 150 $\mu\text{m}/\text{m}^\circ\text{C}$. Further, Applicants note that data illustrating the reduction of low temperature shrinkage of a tube described by the present application, i.e., a tube comprising a cross-linked high density polyethylene and chopped glass fill, as compared to a mono-wall tube formed of cross-linked high density polyethylene, e.g., a polyolefin, are provided in Table 1. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would recognize that the tube and the filler as described by the present application would have a coefficient of thermal expansion lower than that of the cross-linked polyolefin itself.

Accordingly, Applicants respectfully submit that the specification is sufficient to convey to one of ordinary skill in the art that Applicants were in possession of the feature of the "coefficient of thermal expansion of the filler and the tube being lower than that of the cross-linked polyolefin" as recited in Claim 1.

Further, Applicants note that an embodiment of the "cross-linked density range" is provided on page 6, line 23, through page 7, line 1, of the application as filed. More

particularly, the description provides that, in some embodiments, the cross-linked density ranges between 40.0%-90.0% (page 6, line 24) and between 65.0%-89% (page 7, line 1) as measured by ASTM Standard D2765-95. These same ranges also are provided on page 9, lines 5-6, of the application as filed.

Therefore, Applicants respectfully submit that the specification is sufficient to describe to one of ordinary skill in the art that Applicants were in possession of the feature of the "cross-linked density range" as recited in Claim 5.

With regard to the term "nominal diameter," Applicants have deleted the phrase "a nominal diameter of 14 μ m and" from Claim 7. Accordingly, Applicants respectfully submit that because the term "nominal diameter" is not recited in Claim 7 as amended, the element "nominal diameter" does not need to be described in the specification.

In sum, Applicants respectfully submit that the specification as filed conveys to one of ordinary skill in the art that Applicants were in possession of the invention commensurate with the scope of the claims. Thus, Applicants respectfully submit that the specification as filed meets the requirements of 35 U.S.C. § 112, first paragraph, and respectfully request that the rejection of Claims 1-8, and 11 under 35 U.S.C. § 112, first paragraph, be withdrawn and that Claims 1-8, and 11 be allowed at this time.

V. Claims Rejection – 35 U.S.C. § 102(b)

Claims 1-4, 6 and 8 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,761,362 to Yang et al. (hereinafter "Yang et al."). More particularly, the Examiner asserts that Yang et al. (Figures 1-6, Claims 1-19, and Column 6, lines 22-67) discloses a fiber optic tube cable comprising an air blown fiber tube made from a cross-linked polyolefin or polyethylene and mixed with a filler material wherein the coefficient of thermal expansion of the filler and the tube is lower than that of the cross-linked polyolefin. The Examiner further asserts that the filler described by Yang et al. can be a talc, mica, or glass fibers, etc., in the amount not greater than 5.0 % by mass.

Applicants note that it is well settled that for a cited reference to qualify as prior art under 35 U.S.C. § 102, each element of the claimed subject matter must be

disclosed within the reference. See Hybritec, Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 231 U.S.P.Q. 81 (Fed. Cir. 1986) (stating that “[i]t is axiomatic that for prior art to anticipate under 102 it has to meet every element of the claimed invention”). Accordingly, Applicants respectfully submit that Yang et al. does not disclose every element of Claims 1-4, 6 and 8 of the instant application and therefore cannot anticipate Claims 1-4, 6 and 8 under 35 U.S.C. 102(b). More particularly, as will become apparent from the Remarks provided hereinbelow, Yang et al. does not teach the element of an “air blown fiber tube” as recited in independent Claim 1, from which Claims 2-4, 6 and 8 depend.

V. A. Summary of the Instant Application

Preliminarily, Applicants note that the instant application discloses an empty tube formed from a cross-linked polyolefin, such as polyethylene, comprising at least one filler material, such as chopped glass fiber, wherein the tube and the filler has a lower coefficient of thermal expansion than the cross-linked polyolefin itself. The empty tube is installed into a communications network pathway by itself or as a plurality of tubes in the form of a tube cable. The tube forms a duct through which optical fibers are subsequently installed via pressurized gas flow – thus the term “air blown fiber (ABF).” Applicants note that independent Claim 1 of the instant application, from which Claims 2-4, 6 and 8 depend, recites “[a] fiber optic tube cable ... comprising an air blown fiber tube (ABF) within which one or more air blown fiber units can be installed.” (emphasis added). In contrast, Yang et al. does not disclose an air blown fiber tube and therefore cannot anticipate the subject matter recited in Claims 1-4, 6 and 8.

V. B. Subject Matter Recited in Claims 1-4, 6 and 8 of the Present Application in view of Yang et al.

Applicants note that Yang et al. discloses a fiber optic cable comprising one or more single layer and/or dual-layer buffer tubes formed from a polypropylene-polyethylene copolymer comprising nucleating agents blended into the polymer melt during the extrusion process. Applicants note further that the buffer tubes disclosed by

Yang et al. are gel-filled and are manufactured by extruding the polymer directly over the gel filling and optical fiber(s).

Applicants respectfully submit, however, that Yang et al. does not disclose a fiber optic tube cable comprising an air blown fiber tube formed from a cross-linked polyolefin as described in Claim 1 of the instant application. Thus, because Yang et al. does not disclose an air blown fiber tube, Yang et al. does not disclose every element of Claim 1 and therefore cannot anticipate the subject matter recited in Claim 1. Because independent Claim 1 is patentably distinguishable over Yang et al., dependent Claims 2-4, 6 and 8 also are patentably distinguishable over Yang et al. since they recite the subject matter of independent Claim 1 and merely add additional limitations thereto.

Accordingly, Applicants respectfully request that the rejection of Claims 1-4, 6, and 8 under 35 U.S.C. § 102(b) be withdrawn and Claims 1-4, 6, and 8 be allowed at this time.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 5, 7, and 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yang et al. The Examiner asserts that Yang et al. discloses all the features of Claims 5, 7, and 11 as described above except (1) the cross-linked density range, (2) the nominal diameter, and (3) the coefficient of thermal expansion being less than 150 $\mu\text{m}/\text{m}^{\circ}\text{C}$ over the temperature range of 20 to -40°C . Further, the Examiner asserts that the presently claimed subject matter does not provide any reasons or specific problem to be solved by these specific properties of the materials. Accordingly, the Examiner contends that it would have been obvious to one having ordinary skill in the art at the time of the instant invention to select materials with these properties under the assertion that it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. Official Action, at page 4 (citing In re Leshin, 125 U.S.P.Q. 416). Applicants respectfully disagree.

Preliminarily, Applicants note that the Examiner bears the initial burden of factually supporting a prima facie conclusion of obviousness. See Manual of Patent

Examining Procedure (hereinafter "MPEP") § 2142. To establish a prima facie case of obviousness, the Examiner must meet the following criteria. See MPEP § 2143.

First, there must be some suggestion or motivation, either in the reference itself or the knowledge generally available to one of ordinary skill in the art, to modify the reference. Id. Second, there must be a reasonable expectation of success. Id. Third, the prior art reference must teach or suggest all of the claim elements. Id. In view of all of the factual information, the Examiner must then make a determination whether the claimed subject matter "as a whole" would have been obvious at that time to that person. See MPEP § 2142. Impermissible hindsight must be avoided and the legal conclusion of obviousness must be reached on the basis of the facts gleaned from the prior art. Id. Applicants believe that the Examiner has failed to establish a prima facie case of obviousness and has used impermissible hindsight in constructing the 35 U.S.C. § 103(a) rejection.

Applicants submit that the object of Yang et al. is to provide a fiber optic buffer tube with flexibility, strength, and thermal stability. In the method described by Yang et al., the addition of nucleating agents creates nucleation sites within the polymer melt. The nucleation sites increase the rate of crystallization of the polymers as the plastic tube cools. In Yang et al., the copolymer is extruded directly over the filling gel and optical fibers during the manufacturing process. As the extruded tube cools, it will have the tendency to shrink longitudinally. If the longitudinal shrinkage is excessive, a large amount of excess fiber can cause severe bending of the optical fiber(s) within the buffer tube causing an increase in the optical signal loss. A benefit of the technology disclosed by Yang et al. is to reduce the process shrinkage of the polypropylene-polyethylene copolymer during the extrusion process to improve control of excess fiber length.

However, Applicants respectfully submit that Yang et al. does not disclose air blown fiber (ABF) tubes or the benefits of the cross-linked polyolefin and the resulting improved mechanical or thermal characteristics as provided in the present application. Instead, Yang et al. is focused on modifying the physical properties of the

polypropylene-polyethylene copolymer by increasing the crystallization rate during extrusion through the introduction of nucleating agents.

Applicants further assert that the addition of fillers is incidental to the main focus of the subject matter disclosed in Yang et al. because the described fillers are not nucleating agents. The approach disclosed in the present application, i.e., using a cross-linked polyolefin, and more particularly, a cross-linked high-density polyethylene, combined with defining the cross-link density range of the cross-linked polyolefin to achieve optimal thermal performance, further combined with the addition of high modulus filler of low coefficient of thermal expansion, is unique and is not suggested in any fashion whatsoever by Yang et al.

Applicants submit that the subject matter disclosed in the present application provides a non-obvious solution to the longstanding problem of low-temperature shrinkage suffered by ABF buffer tubes formed from polyolefins. Indeed, Applicants note that Yang et al. states a well-known requirement that "in virtually all optical fiber cables, it is desirable to have a buffer tube made from a material with a high Young's modulus." See Yang et al., column 1, lines 33-35. Further, Yang et al. states that "polypropylene-polyethylene copolymers generally have higher thermal expansion coefficients and lower Young's modulus than PBT, PC or Nylon such that a buffer tube made with the polypropylene-polyethylene copolymer would have greater shrinkage and less compression-tension resistance." See Yang et al., column 1, lines 62-67. Applicants respectfully submit that the problem of greater shrinkage suffered by ABF buffer tubes formed from polyolefins, such as a polypropylene-polyethylene copolymer, is unexpectedly and surprisingly solved by the subject matter disclosed and claimed in the present application

The present application discloses an empty tube formed from a cross-linked polyolefin, such as polyethylene, comprising at least one filler material, such as chopped glass fiber, with a lower coefficient of thermal expansion as compared to the cross-linked polyolefin. The empty tube is installed into a communications network pathway by itself or as a plurality of tubes in the form of a tube cable. The tube forms a

duct through which optical fibers are subsequently installed via pressurized gas flow, thereby forming an air blown fiber (ABF) tube.

In contrast, the primary concerns addressed in Yang et al., such as control of excess fiber length in the buffer tube, do not apply to air blown fiber (ABF) tubes because the optical fibers comprising an ABF tube are installed after the tube has been installed into a final configuration within the network. So, in air blown fiber (ABF) technology, one is not concerned with creating nucleation sites using nucleating agents to control the rate of crystallinity as described by Yang et al.

One aspect of the subject matter disclosed in the present application is to minimize both post-extrusion (permanent) shrinkage and the coefficient of thermal expansion of the installed air blown fiber (ABF) tube and tube cable after they are installed and during their lifetime within the network. Obtaining a certain specific cross-link density, as recited, for example, in Claim 5 and described on page 6, line 22, through page 7, line 1, of the application as filed, helps to ensure optimal stability of the cross-linked polyolefin while addition of filler provides mechanical reinforcement to further reduce expansion and contraction dimensional changes.

Applicants further note that cross-linked polyolefin compounds do not inherently have greatly improved post-extrusion shrinkage and coefficient of thermal expansion properties as compared with non-cross-linked polyolefin compounds. Control of cross-link density improves post-extrusion shrinkage and coefficient of thermal expansion characteristics. The addition of a filler with a low coefficient of thermal expansion further enhances these properties. The unexpectedly improved properties of the presently disclosed air blown fiber (ABF) tubes are illustrated by the data provided in Table 1. Applicants respectfully submit that the unexpectedly improved properties of the presently disclosed air blown fiber (ABF) tubes are not recognized or suggested by Yang et al.

Accordingly, Applicants respectfully submit that there is no suggestion or motivation either in Yang et al. or the knowledge generally available to one of ordinary skill in the art, to modify the method of Yang et al. to the air blown fiber (ABF) tubes of the present application. Further, Applicants respectfully submit that Yang et al. does not

teach or suggest the claim elements of Claims 5, 7, and 11, which are ultimately dependent from Claim 1, which recites an air blown fiber (ABF) tube. Thus, Applicants respectfully submit that Claims 5, 7, and 11 are not obvious over Yang et al. Accordingly, Applicants respectfully request that the rejection of Claims 5, 7, and 11 under 35 U.S.C. § 103(a) in view of Yang et al. be withdrawn at this time and Claims 5, 7, and 11 be allowed at this time.

CONCLUSION

In light of the above Amendments and Remarks, it is respectfully submitted that the present application is now in proper condition for allowance, and an early notice to such effect is earnestly solicited.

If any small matter should remain outstanding after the Patent Examiner has had an opportunity to review the above Remarks, the Patent Examiner is respectfully requested to telephone the undersigned patent attorney in order to resolve these matters and avoid the issuance of another Official Action.

DEPOSIT ACCOUNT

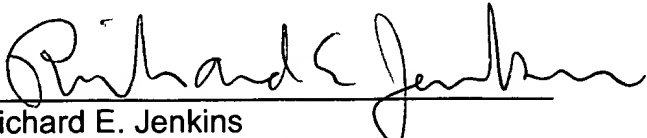
The Commissioner is hereby authorized to charge any fees associated with the filing of this correspondence to Deposit Account No. 50-0426.

Respectfully submitted,

JENKINS, WILSON & TAYLOR, P.A.

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158/71

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